

S/N 10/567944

REMARKS

Favorable reconsideration of this application is requested in view of the above amendments and the following remarks.

Claim 1 has been amended and is supported by, for example, page 1, lines 18-24, page 5, line 1 and 0031 and FIG. 1-8 of the specification. Applicants submit that a "probe unit", as recited in claim 1, would be recognized as referring generally to the unit connected to a main processing unit that conducts scanning and sends signals to the main unit to be processed, as exemplified by an electroacoustic conversion unit (two-dimensional array 2), intra-group processors and a selection unit (switch 3-1) in FIG. 1.

Prior Art Rejections

Claims 1-6 have been rejected under 35 U.S.C. 102(b) as being anticipated by Mason (U.S. 6,238,346). Applicant respectfully traverses this rejection.

Claim 1 is directed to an ultrasonic diagnostic apparatus having a probe unit with intra-group processors corresponding to the respective sub-arrays and performing beam-forming with respect to reception signals from the respective sub-arrays. The probe unit further contains a selection unit that selects intra-group processors with j rows ($j \leq J$) and k columns ($k < K$) as a target from the intra-group processors with J rows and K columns and includes a switch that connects the selected intra-group processor to the cable, the selection being performed while shifting the selection target of the intra-group processors in a column direction. A benefit of this is a reduction in the required number of signal lines. Beam-forming is a well known type of signal processing in which a plurality of signals are subjected to a delay addition, thus allowing arrangement into a reduced number of signal lines. The required number of signal lines is reduced because signals output from $m \times n$ electroacoustic conversion devices of the sub-arrays are subjected to beam-forming within the intra-group processor and are then output through the switch to the signal lines of the cable. Moreover, it should be noted that beam-forming in transmission is done to generate a plurality of transmission pulses based on a single trigger pulse. Based on a single trigger pulse transmitted through the cable, the intra-group processor generates a plurality of driving pulses for independently driving $m \times n$

S/N 10/567944

electroacoustic conversion devices. Thus, a number of signal lines for transmitting the trigger signals are reduced.

In Mason, the receiver circuitry 50 performs beam-forming. In Mason, switches 42, 44, 46, etc. correspond to the switch of claim 1 that connects the selected intra-group processor to the cable. Switches 42, 44, 46, etc. perform switching functions only and are not capable of performing beam-forming (column 3, lines 60-64). Therefore, the subarray 16 is composed of $N \times X$ transducer elements 14 among an array of $N \times M$ transducer elements 14 and $N \times X$ signal lines are necessary for connecting the subarray 16 to the receiver 50 resulting in a larger number of signal lines, and accordingly, a larger cable, than what is required in claim 1 above. As discussed in the specification (page 1, line 25 to page 2, line 5), the power consumption and heat generation, as well as the handling of such a large cable, are problematic. Thus, the effects of reducing the required number of signal lines are significant and claim 1 is patentably distinct from Mason.

Claims 2-6 are allowable at least by virtue of their dependence on independent claim 1 and the rejection of these claims should be withdrawn. Applicant does not concede the correctness of the rejection.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

If the Examiner believes a telephone conference would advance the prosecution of this application, the Examiner is invited to telephone the undersigned at the below-listed telephone number.



Dated: August 10, 2009

Respectfully submitted,

HAMRE, SCHUMANN, MUELLER &
LARSON, P.C.
P.O. Box 2902
Minneapolis, MN 55402-0902
(612) 435-3800

By: 

Douglas P. Mueller
Reg. No. 30,300
DPM/lif